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VIA WWW.REGULATIONS.GOV

Internal Revenue Service
CC:PA:LPD:PR (Notice 2022-51)
Room 5203
P.O. Box 5203, Ben Franklin Station
Washington, D.C. 20044

The Honorable Lily L. Batchelder
Assistant Secretary for Tax Policy
Department of the Treasury
1500 Pennsylvania Ave., NW
Washington, D.C. 20220

Mr. William M. Paul
Principal Deputy Chief Counsel and Deputy Chief Counsel (Technical)
Internal Revenue Service
1111 Constitution Ave., NW
Washington, D.C. 20224

Re: Comments on IRS Notice 2022-51 Regarding the Domestic Content Bonus Credit

Dear Ms. Batchelder and Mr. Paul:

Hanwha Q CELLS USA Inc. ("**Qcells**") is pleased to submit comments to the Department of the Treasury ("**Treasury**") and the Internal Revenue Service ("**IRS**") in response to your request for comments in IRS Notice 2022-51 issued in respect of anticipated guidance to implement the domestic content provisions of sections 45, 45Y, 48, and 48E of the Internal Revenue Code of 1986, as amended or created (the "**Code**") by Public Law 117-169, 136 Stat. 1818 (August 16, 2022), commonly known as the Inflation Reduction Act of 2022 ("**IRA**"). All section references herein are to the Code unless otherwise indicated.

Qcells, the largest crystalline silicon solar manufacturer in the United States (and in all of North America), desires to scale up its investments and build a complete U.S.-based clean energy supply chain from polysilicon to finished solar panels. Building a fully-integrated domestic solar manufacturing supply chain is expected to create many thousands of careers in the industry and enable the U.S. to realize crucial energy independence, supply chain security and climate goals. Qcells currently has a Georgia-based factory which produces 1.7 gigawatts of solar modules per year and anticipates opening a second Georgia-based factory in early 2023 which will produce 1.4 gigawatts of solar modules per year. Together, the facilities will account for approximately

one-third of the United States' solar module manufacturing capacity. Qcells' current facility provides more than 750 jobs and it is expected that the second facility will provide an additional 470 jobs. As a result of the IRA, Qcells seeks to add significant additional capacity across the solar supply chain and create many more high quality manufacturing jobs.

Additionally, Qcells recently expanded by becoming the largest shareholder of REC Silicon, a major U.S. manufacturer of polysilicon, the key raw material used to produce solar modules. This investment will help U.S. businesses secure the raw material critical to the solar supply chain as global competition over clean energy sources intensifies in the coming years. Efforts are also underway to manufacture low-carbon polysilicon at the company's factory in Moses Lake, Washington, which is powered by emission-free hydroelectricity. That facility is projected to restart production in the second half of 2023.

Qcells expects to make significant additional investments to re-shore the U.S. solar supply chain as a result of the passage of the IRA. We respectfully submit below are our responses to certain of the specific questions raised by Treasury and the IRS in IRS Notice 2022-51 as well as other general recommendations and requests for guidance which we believe are necessary.

DOMESTIC CONTENT BONUS CREDIT – PURPOSE AND INTENT

The domestic content bonus credit plays a pivotal role in advancing policy goals for re-shoring the solar supply chain.[1] Re-shoring the solar supply chain beyond module assembly will enhance energy independence and national security, generate many thousands of high-quality manufacturing jobs of the future, and provide the investment, technology and supply chain stability necessary to meet crucial climate goals.

The express purpose of the domestic content bonus credit is to bolster the U.S. supply chain for renewable energy: "[T]he Inflation Reduction Act establishes Make it in America provisions for the use of American-made equipment for clean energy production." White House, Fact Sheet: The Inflation Reduction Act Supports Workers and Families (Aug. 19, 2022) (available online at: https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/).

When creating the domestic content bonus, Congress clearly intended to provide an incentive to benefit solar modules made with U.S.-made solar cells. As described herein, any

[1] The domestic content bonus credit spurs domestic manufacturing by incentivizing eligible taxpayers to use steel, iron, and manufactured products that have been produced in the United States by granting an additional 10 percent credit for investments in qualified facilities and energy projects that use U.S. components. The domestic content bonus credit acts as an enhancer to specific base credits. For example, in order to incentivize the use of domestic products with respect to a qualified facility under section 45, not less than 40 percent of the total costs of any manufactured products of such facility (20 percent for off-shore wind) must be attributable to manufactured products (including components) which are "mined, produced, or manufactured in the United States."

analysis using the Federal Transit Administration regulations (like other laws and regulations) results in modules and cells being treated as a single "product" – all manufacturing of which must be of U.S. origin to meet the domestic requirement.

Even if the text of 49 CFR 661 did not require use of U.S. solar cells (it does, as noted above), there would be compelling policy reasons to require use of U.S. solar cells. Solar cells provide the essential characteristic of solar modules, and requiring the use of solar cells produced in the United States for purposes of the domestic content bonus credit promotes a robust domestic solar cell manufacturer industry. Requiring that U.S. cells be manufactured in the United States (instead of allowing foreign-manufactured cells to be incorporated into end products manufactured in the United States) reinforces the policy in favor of domestic solar cell manufacturing reflected in new section 45X. Hastening investments in domestic solar cell manufacturing by requiring that solar modules include U.S. solar cells (*i.e.*, the "Buy America" standard) will rapidly accelerate the re-shoring of the solar supply chain, with corresponding enhancements to national security and energy security.[2]

Congress also intended to incentivize use of U.S.-made wafers, U.S.-mined and refined polysilicon, and U.S.-made polymeric backsheet as evidenced by the parenthetical "(including components)" language in clause (iii) of the domestic content bonus credit and section 45X. Re-shoring of these critical inputs for solar modules will yield further energy independence, national security, employment and crucial climate benefits.

Domestic solar manufacturers (and would-be domestic solar manufacturers) need clarity as to whether their activities satisfy the standard for the domestic content bonus such that the incorporation of their manufactured product components will allow producers and developers to qualify for the domestic content bonus credit. Specific recommendations for guidance are as follows:

[2] The requirement to use U.S.-made solar cells will not delay deployment of solar energy projects that seek to benefit from the investment tax credit and production tax credit. As a result of the IRA, significant expansion of domestic solar cell production is imminent. Moreover, the waiver provisions in 49 CFR 661.7 provide a safeguard that can be used on a temporary basis in the event of any actual or perceived capacity constraint.

SUMMARY OF RECOMMENDATIONS

1. **Confirm that FTA's Regulations and Legal Framework Apply to the Domestic Content Bonus Credit – and That a Solar Facility Constitutes an "End Product" and Solar Modules are "Components":** We recommend that guidance be issued to confirm that: (a) the Federal Transit Administration's ("FTA") domestic content requirements—including the regulations at 49 CFR 661 and the guidance published in the Federal Register and other documents—apply and require identification of an end product and components; (b) a solar facility constitutes an "end product" (and must be manufactured in the U.S. using components of U.S. origin); and (c) solar modules constitute components (and must be of U.S. origin).

2. **Confirm that Solar Modules Manufactured in the United States Must Use Solar Cells Manufactured in the United States to Meet the Domestic Content Requirement:** We urge Treasury and the IRS to issue guidance to confirm that all manufacturing processes of solar modules *and their constituent solar cells* must occur in the United States for the solar modules to be considered "produced in the United States." Solar modules do not constitute a "new product" for purposes of 49 CFR 661 because there is no functional difference between solar cells and solar modules, and because manufacturing solar modules from solar cells does not involve a substantial transformation. Thus, all manufacturing processes of the solar cells *and* solar module must take place in the United States to be deemed to be "produced in the United States."

   Significant additional U.S. solar cell manufacturing capacity is incentivized by the IRA and, within the next 18 months, is scheduled to come on-line. Requiring U.S. cells consistent with FTA rules thus will not create any bottleneck, and in any event, the IRS can temporarily use the waiver authority under 49 CFR 661.7 in the event of any temporary perceived or actual supply constraint for cells.

3. **Provide Guidance that U.S. Polysilicon, Wafers, and Backsheet Will Be Taken Into Account for Purposes of Meeting the Adjusted Percentage of Domestic Manufactured Products:** The IRA states that no less than the adjusted percentage of the total costs of manufactured products of a qualified facility must be "attributable to manufactured products *(including components)* which are mined, produced, or manufactured in the United States" (emphasis added). The term "(including components)" must be given effect. Section 45X, which was created under the IRA, defines solar modules, photovoltaic cells, photovoltaic wafers, solar grade polysilicon, and polymeric backsheets as "solar energy components." Thus we urge Treasury and the IRS to provide guidance that the use of U.S. wafers, polysilicon, and backsheets will be taken into account, by, for example, adding an amount equal to the acquisition cost of those items to the cost of U.S. solar modules when calculating whether the adjusted percentage has been met.

I. CONFIRM THAT FTA'S REGULATIONS AND LEGAL FRAMEWORK APPLY TO THE DOMESTIC CONTENT BONUS CREDIT – AND THAT A SOLAR FACILITY CONSTITUTES AN "END PRODUCT" AND SOLAR MODULES ARE "COMPONENTS"

1. FTA Regulations at 49 CFR 661 and Implementing Policies and Guidance Must Be Used to "Determine" Whether Items Are "Produced in the United States" – and Require the Identification of the End Product and Component

[IRS Notice 2022-51, Section 3.03(1)(a): What regulations, if any, under 49 C.F.R. 661 (such as 49 C.F.R. 661.5 or 661.6) should apply in determining whether the requirements of sections 45(b)(9)(B) and 45Y(g)(11)(B) are satisfied? Why?]

The IRA's domestic content bonus credit provision states in part as follows:

> (B)(i) IN GENERAL.—The requirement described in this clause is satisfied with respect to any qualified facility if the taxpayer certifies to the Secretary (at such time, and in such form and manner, as the Secretary may prescribe) that any steel, iron, or manufactured product which is a component of such facility (upon completion of construction) was produced in the United States (as determined under section 661 of title 49, Code of Federal Regulations).

Section 45(b)(9)(B).[3]

The IRA states that whether a taxpayer meets the domestic content requirement is to be "as determined under" 49 CFR 661. 49 CFR 661 contains regulations of the Federal Transit Administration ("FTA"). Under a plain and ordinary reading of the statute, domestic content determinations under the IRA are to be made in the same manner as those determinations are made under 49 CFR 661. This requires use of the regulations codified at 49 CFR 661 in their entirety, as well as the analytic framework on which the regulations are built (as memorialized in the Federal Register at the time the regulations were promulgated and amended), and related FTA guidance documents.[4]

[3] The domestic content bonus credits in Code sections 48 and 48E use this standard, which is cross-referenced therein. Code section 45Y includes a verbatim copy of this text, except that the phrase "this subclause" replaces "this clause" in the first sentence.

[4] 49 CFR 661 includes provisions that are unrelated to making determinations as to whether items are produced in the United States. *See, e.g.*, 49 CFR 661.6 (certification requirements). Any such provisions are not required by the IRA to be given effect. Some provisions in 49 CFR 661 bestow on the Administrator of FTA discretion to make certain decisions and take certain actions. *See, e.g.*, 49 CFR 661.7 (waivers). To the extent that any such provision is part of the legal apparatus pursuant to which "as determined by" determinations are made, the substantive and procedural aspects of the provision must be applied by the IRS. The IRA does not preclude the IRS from

A fundamental feature of the analytic framework in 49 CFR 661 is the need to first identify an end product, to next identify components of the end product, and then to apply the applicable legal standard – whether for steel and iron, or for manufactured products, as appropriate. *See*, *e.g.*, FTA Guidance, *Kansas City Area Transportation Authority* at 4 (June 08, 2011).

Also fundamental to the analytic framework implemented in 49 CFR 661 is the notion that the taxonomy—of end product, component, subcomponent—does not shift based on circumstances. Under a prior FTA approach, what constituted the "end product" shifted based on circumstances, because the FTA defined the end product as: "*the deliverable item* specified by the grantee in the third party contract." 72 Fed. Reg. 53688, 53691 (Sept. 20, 2007) (emphasis added).[5]

In contrast, the FTA's modern analytic framework in 49 CFR 661 defines the term "end product" in a way that "end products do not shift" based on the contract deliverable "and components and subcomponents retain their designation." *Id.* The regulations today define an end product based on its function, and not on whether the end product as a whole is being purchased on a contract. The definitions of end product and component now are as follows:

> *End product* means any vehicle, structure, product, article, material, supply, or system, which directly incorporates constituent components at the final assembly location, that is acquired for public use under a federally-funded third-party contract, and which is ready to provide its intended end function or use without any further manufacturing or assembly change(s). A list of representative end products is included at Appendix A to this section.[6]
>
> *Component* means any article, material, or supply, whether manufactured or unmanufactured, that is directly incorporated into the end product at the final assembly location.

49 CFR 661.3.

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designating an IRS official to exercise such discretion – however, any such IRS official would be compelled to apply the legal standards for the exercise of discretion as set forth in 49 CFR 661.

[5] "Under this 'shifting' methodology, the same item could be an end-product, a component, or a subcomponent, depending upon the deliverable specified in the third-party contract, with applicable Buy America requirements attaching based on an item's characterization." *Id.* A practical example: Under the prior FTA framework, a bus, or an engine, or a spark plug could be the end product if the bus, the engine, or the spark plug, respectively, were identified as the contract deliverable. Because 49 CFR 661 imposes domestic content obligations on components but not subcomponents, shifting the end product from bus, to engine, to spark plug, convulsed the supply chain.

[6] The list of representative end products includes, in part: "(3) Manufactured end products: Infrastructure projects not made primarily of steel or iron, including structures (terminals, depots, garages, and bus shelters) . . . .; data processing systems; and mobile lifts, hoists, and elevators." 49 CFR 661.3 App. A.

2. A Solar Facility Constitutes An "End Product" (and Must Be Manufactured in the U.S. Using Components of U.S. Origin)

[IRS Notice 2022-51, Section 3.03(2)(c): Is guidance needed to clarify what constitute an "end product" (as defined in 49 C.F.R. 661.3) for purposes of satisfying the domestic content requirements?]

A qualified facility that is a solar facility constitutes an "end product" for purposes of 49 CFR 661. Set forth below are three reasons for this conclusion:

First, the term "facility" for purposes of the Code is functionally the same as the definition of "end product" in 49 CFR 661. Although the IRA does not define the term *facility* in the phrase "qualified facility,"[7] the IRS has issued guidance on section 45 that defines the term as follows:

> A facility . . . generally includes all components of property that are functionally interdependent. Components of property are functionally interdependent if the placing in service of each of the components is dependent upon the placing in service of each of the other components in order to generate electricity.

IRS Notice 2013-29.[8] This definition aligns with the definition of *end product* in 49 CFR 661, which includes: any structure "which directly incorporates constituent components at the final assembly location . . . , and which is *ready to provide its intended end function or use without any further manufacturing or assembly change*." *Id.* at § 661.3 (emphasis added).

Second, a solar facility is comparable to other items that the FTA identifies as end products. 49 CFR 661.3 Appendix A includes examples of manufactured end products:

> Infrastructure projects not made primarily of steel or iron, including structures (terminals, depots, garages, and bus shelters) . . . .; data processing systems; and mobile lifts, hoists, and elevators.

A solar facility consists of mechanical components interconnected with wiring and cables and is comparable to a data processing system or a mobile lift insofar as all the equipment is "ready to provide its intended end function or use without any further manufacturing or assembly

[7] The work "qualified" in the phrase "qualified facility" generally relates to the date on which the facility was placed in service. Section 45(d).

[8] "For example, on a wind farm for the production of electricity from wind energy, an electricity-generating wind turbine, its tower, and its supporting pad comprise a single facility. *Each such facility can be separately operated and metered and can begin producing electricity separately*." *Id.* (emphasis added).

change" only after all of the interconnections and interdependent equipment has been brought together, aligned, connected, and tested.

Third, the IRA uses the term "component" in the same sentence that the IRA directs the IRS to use 49 CFR 661 (which defines the term component). In this context, the term "component" should be given a consistent meaning.

Under the taxonomy of 49 CFR 661, the higher-tier structure comprised of components is referred to as an *end product*. Under the IRA, the higher-tier structure comprised of components is referred to as a qualified facility. Section 45(b)(9)(B) ("The requirement described in this clause is satisfied with respect to any qualified facility if . . . any steel, iron, or manufactured product *which is a component of such facility* (upon completion of construction) was produced in the United States.") (emphasis added). Because the term "component" should be given a consistent meaning, as a matter of logic and reason, a qualified facility should be understood to be an end product for purposes of 49 CFR 661.

3. Solar Modules Constitute Components (And Must Be of U.S. Origin)

[IRS Notice 2022-51, Section 3.03(2)(a): Does the term "component of a qualified facility" need further clarification? If so, what should be clarified and is any clarification needed for specific types of property, such as qualified interconnection property?]

There can be little doubt that solar modules are components of a solar facility. Solar modules are "directly incorporated into the end product at the final assembly location" because the modules are directly incorporated into the solar facility at the job site. 49 CFR 661.3.

Solar modules thus must be manufactured in the United States. 49 CFR 661.5(d)(2).

There is no requirement under the FTA regulations for the subcomponents of the solar facility to be of U.S. origin. The term "components" in 49 CFR 661.5(d)(2) refers to components *of the end product* and not components *of the solar modules* (which items would be subcomponents of the end product). Under FTA's analytic framework, components of end products are to be treated consistently. 72 Fed. Reg. at 53692. It would be inconsistent and wrong to "shift" the unit of analysis and require all components of solar modules (which are subcomponents of the solar facility) to be of U.S. origin.[9]

[9] The FTA deliberately discarded the "shifting" approach: Under FTA's old approach: "a bicycle rack [was] treated as a 'component' if specified in a contract for the purchase of a new bus, but [was] treated as an 'end product' if subsequently purchased as an aftermarket accessory or part of a vehicle rehabilitation or retrofit. FTA believe[ed] that the same Buy America rules should apply regardless of when the bicycle rack is purchased, i.e., a bike rack will be treated as a component . . . . This approach will lead to consistency in the manufacturing of components and will greatly simplify the procurement process." *Id.*

Recommendation

For all these reasons, we recommend that guidance be issued to confirm that: (a) the FTA domestic content requirements—including the regulations at 49 CFR 661 and the guidance published in the Federal Register and other documents—apply and require identification of an end product and components; (b) a solar facility constitutes an "end product" (and must be manufactured in the U.S. using components of U.S. origin); and (c) solar modules constitute components (and must be of U.S. origin).

II. CONFIRM THAT SOLAR MODULES MANUFACTURED IN THE UNITED STATES MUST USE SOLAR CELLS MANUFACTURED IN THE UNITED STATES TO MEET THE DOMESTIC CONTENT REQUIREMENT

[IRS Notice 2022-51, Section 3.03(5): Please provide comments on any other topics relating to the domestic content requirements that may require guidance]

The standard for "manufacture" under 49 CFR 661 is high. A manufactured product is an item produced "as a result of [a] manufacturing process" – and a manufacturing process is, in turn defined as:

> [T]he application of processes to alter the form or function of materials or of elements of the product in a manner adding value and transforming those materials or elements so that they represent *a new end product functionally different* from that which would result from mere assembly of the elements or materials.

Id. at § 661.3 (emphasis added). The point at which the manufacturing of a subcomponent ends and the manufacturing of a component begins is the point when manufacturing processes "alter the form or function of materials or elements" to add value and transform materials and elements to produce an end product "functionally different" than would result from mere assembly. In the solar supply chain, this occurs when a silicon wafer is processed into a solar cell.

1. A Solar Module is Not "Functionally Different" From a Solar Cell and Thus Does Not Constitute a New Product

Solar cells impart the essential characteristic of solar modules and represent the most significant portion of the cost of a solar module. Manufacturing of solar cells alters the form and function of the silicon wafer material into a photovoltaic semiconductor material capable of converting sunlight to electricity. The manufacturing processes are complex and alter the very chemical composition of the silicon wafer raw material.

There are five principal stages involved in the manufacture of solar modules based on crystalline silicon photovoltaic technology.[10] First, polysilicon is refined, then it is formed into ingots, using different processes to produce monocrystalline ingots and multicrystalline ingots. The ingots are then sliced into wafers and converted to cells, which are then assembled into the finished product, solar modules. The common production processes for the last three steps are summarized below.

Ingot/Wafer Production:[11]

High purity polysilicon is formed into ingots by various processes depending on whether the resulting ingot will be a monocrystalline ingot or a polycrystalline ingot. At this stage, the ingots are processed by cutting and squaring the ingots. The ingots are then sliced into wafers using a wire saw (or a diamond wire saw). The wafers are cleaned, dried, and inspected.

Cell Production:

The main steps in producing a standard, p-type, aluminum back surface field solar cell are as follows:

- Cleaning and texturing: After cleaning, the wafer undergoes a chemical treatment that reduces the reflection of sunlight and increases light absorption.

- Diffusion: Phosphorus is diffused into a thin layer of the wafer surface. The wafer surface is exposed to phosphorus gas at a high heat, creating a negative potential electrical orientation at the surface. The combination of that layer and the boron-doped layer below creates the p/n junction.

- Edge isolation: A thin layer of silicon is then removed from the edge of the cell to separate the positive and negative layers.

- Coating: Next, a silicon nitride antireflective coating is added to the cells to increase the absorption of sunlight.

- Printing: Metals are then printed on the solar cell to collect the electricity. The fingers printed on the front of the cell are connected to the module via busbars. A metal layer, typically aluminum, is also printed on the back of the cell.

[10] The cell manufacturing process varies by technology.

[11] *See Crystalline Silicon Photovoltaic Cells and Modules from China,* Investigation Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Pub. 4874 at I-43–I-49 (March 2019) ("USITC Publication 4874").

- Co-firing: The cells then enter a furnace, where the high temperature causes the silver paste to become imbedded in the surface of the silicon layer, forming a reliable electrical contact.

- Testing and sorting: The final step in the process is the testing and sorting of the cells.

As illustrated by the production process above, solar cell production is both capital intensive and requires a skilled workforce.[12]

Of all the processing steps described above, the crucial step is the creation of a positive-negative junction (referred to as the "p/n junction") inside the crystalline silicon wafer that enables the photovoltaic effect and converts a wafer into a functioning solar cell. Thus, in addition to the significant resources required to conduct these operations, the cell manufacturing process also has considerable qualitative significance by imparting the "essential" character of the finished product:

> [T]he p/n junction is responsible for creating the conditions that induce the photovoltaic effect that ultimately generates electricity, and that the metallic grids and contacts are only responsible for channeling this electricity out of the cell. [13]

That the p/n junction is a transformative step in the manufacture of a solar cell is reflected in the relevant agencies' administration of trade laws (including, for example, antidumping and counter-vailing duty orders) with respect to crystalline silicon photovoltaic cells, whether or not assembled into modules.[14] The U.S. Department of Commerce ("Commerce"), the U.S. International Trade Commission ("ITC"), and U.S. Customs and Border Protection ("CBP") have all consistently acknowledged the primacy of p/n junction formation.[15] Commerce has

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[12] USITC Pub. 4874 at I-47.

[13] *See Notice of Scope Rulings*, 86 Fed. Reg. 47,476 (Dep't Commerce Aug. 25, 2021); Memorandum from Lauren Caserta to James Maeder, *Final Scope Ruling on the Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: ET Solar Inc.*, Case Nos. A-570-979, C-570-980 (Scope Inquiry: ET Solar) (June 15, 2021) ("ET Solar Final Scope Ruling") at 9, 11-12.

[14] *See Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules From the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order*, 77 Fed. Reg. 73018 (December 7, 2012); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Countervailing Duty Order*, 77 Fed. Reg. 73017 (December 7, 2012) (collectively the *Solar I Orders*).

[15] *See, e.g.*, Memorandum from Daniel Alexander to James Maeder, *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: Sunspark Technology Inc. Scope*

consistently determined, including in a ruling issued just last year, that the processing step of adding a p/n junction to a wafer to convert it into a functioning solar cell is "complex," "extensive," and "capital-intensive."[16]

Module Assembly:

In contrast, assembling solar modules from solar cells does not result in a product that is functionally different from solar cells or that changes the essential characteristics of the cells. Solar cells and solar modules share the same primary characteristics and the same functions. The production of solar modules results from assembly of solar cells. Specifically, module assembly involves the connection and lamination of solar cells into an environmentally protected final assembly and typically involves the following specific steps:

- Incoming Inspection.
- Cell and String Soldering. This is the first connection step, where individual solar cells are soldered together using tin-coated copper ribbons to form cell strings.
- Matrix Preparation and Bus Bar Soldering: A robot places the cell strings on glass panels and workers complete the matrix layup.
- Lamination: After inspection and electroluminescence testing, the matrix layups are transferred into vacuum laminators.
- Trimming and Framing: Excess material is removed from the edge of the laminate and the aluminum frame is press-fit together.
- Junction Box Installation: The junction box is attached to the back of the solar module using silicone glue.
- Electrical Test: Each solar module undergoes an electrical test and electroluminescence test to inspect for micro-cracks and other defects, a flash test to measure performance, and a grounding test.
- Final Inspection, Sorting, and Packaging: The junction box lids are applied and the solar modules are allowed to cure, followed by a final visual inspection of all solar modules.
- Outgoing Quality Inspection: A sample of solar modules is removed after packaging for a final quality check.

Ruling, Case Nos. A-570-979, C-570-980 (Oct. 23, 2020) ("SunSpark Technology Final Scope Ruling"); ET Solar Final Scope Ruling; U.S. Customs and Border Protection, Ruling H301813 (May 24, 2019); U.S. Customs and Border Protection, Ruling H301201 (Oct. 18, 2019); *Crystalline Silicon Photovoltaic Cells and Modules From China*, Inv. Nos. 701-TA-481 and 731-TA-1190, USITC Pub. 4360 (Nov. 2012) (Final) at I-18; *Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products*, Inv. No. TA-201-75, USITC Pub. 5266 (Dec. 2021) (Extension) at I-58, I-82; *Sunpreme v. United States*, 946 F.3d 1300 (Fed. Cir. 2020) (en banc).

[16] *See* ET Solar Final Scope Ruling at 11.

None of these steps alter the form or function of any material or elements to produce a new product. The two steps that involve soldering individual cells do not alter the cells or the function of the cells. Soldering is simpler than welding, and even welding, when used to connect highly manufactured items such as solar cells, does not rise to the level of a manufacturing process sufficient to produce a new product. FTA Guidance, *Siemens Transportation* (June 3, 2003) (determining that "the use of welding solely for purposes of joining the metal pieces together . . . was an act of mere assembly, not a step in the manufacturing process that altered the pieces to produce a new product."). Similarly, laminating and trimming excess lamination film does not alter the form or function of either the solar cells that are laminated nor the lamination film itself.[17] Adding the frame and junction box are quintessential assembly steps. *Id.* Steps involving inspection and testing do not even rise to the level of assembly.

2. Manufacturing Modules From Cells Involves No Substantial Transformation – Which Provides An Additional Basis to Conclude that Modules are Not a "New Product" for Purposes of 49 CFR 661

Assembling solar modules from solar cells also does not constitute a substantial transformation. Under 49 CFR 661, a "component is considered to be manufactured . . . if the subcomponents have been *substantially transformed* or merged into new and functionally different article." 49 CFR § 661.11(e) (emphasis added).[18]

Although the FTA has not addressed in a published decision whether assembling solar modules from solar cells constitutes a substantial transformation that results in a new product, other agencies, particularly Commerce and CBP, which have responsibility in the administration of duties related to the imports of these products, have concluded that module assembly does *not* constitute substantial transformation.

The "substantial transformation" test is in application, if not in wording, substantially the same as the "functionally different" test in 49 CFR 661.3. Commerce and CBP employ similar substantial transformation analyses to determine the country of origin of goods imported into the United States.

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[17] Memorandum to J. Maeder from P. Shaw re: Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China, and Certain Crystalline Silicon Photovoltaic Products from Taiwan: The Solaria Corporation Scope Ruling at 14 (Dept. Commerce Apr. 8, 2021).

[18] Although the substantial transformation legal standard is codified in FTA regulations for rolling stock, it is not limited as an analytic tool to rolling stock – and, in fact, the FTA has looked for substantial change in contexts other than rolling stock. *See, e.g.*, FTA Guidance, *Santa Cruz Metropolitan Transit District* (Feb. 19, 2015) (determining that finished polycarbonate panels are U.S. origin components because the processes performed in the U.S. "substantially alter the form and function of materials and elements of the raw polycarbonate panels in a manner adding value and transforming those raw panels into finished panels . . . which is a new end product functionally different from that which would result from mere assembly of the raw polycarbonate panels.").

a. Commerce

Commerce describes substantial transformation as follows:

> Substantial transformation means that (i) the good underwent a fundamental change (normally as a result of processing or manufacturing in the country claiming origin) in form, appearance, nature, or character, which (ii) adds to its value an amount or percentage that is significant in comparison to the value which the good (or its components or materials) had when exported from the country in which it was first made or grown. Usually a new article of commerce–normally one with a different name–is found to result from any process that Customs decides has brought about a 'substantial transformation' in the pre-existing components.

U.S. Department of Commerce, Rules of Origin: Substantial Transformation (available online at https://www.trade.gov/rules-origin-substantial-transformation) (enumeration added).[19] In other words, when applying the substantial transformation test, Commerce determines whether, "as a result of manufacturing or processing steps . . . [,] the [product] loses its identity and is transformed into a new product having a new name, character and use" and, consequently, takes on the country of origin where that transformation occurred.[20]

Since 2012, Commerce has consistently found that the country in which the solar cell is produced is the country of origin for purposes of the administration of antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules – and that module assembly does not constitute a substantial transformation.[21]

- "[M]odule assembly does not substantially alter the essential nature of solar cells, nor does it constitute significant processing such that it changes the country of

[19] In Peer Bearing Co.–Changshan v. United States, a case involving Commerce's substantial transformation test, the U.S. Court of International Trade remanded to the agency its determination of no substantial transformation finding that a process that "impart[ed] the very specific physical properties of a [product] that allow for the product to function as [that product]" was "difficult to reconcile" with Commerce's finding that that process was "minor or insignificant." As discussed above, in the case of solar cells and solar modules, it is the solar cell that is responsible for electricity generation, an essential function that does not change when the cells are assembled into modules.

[20] *Bell Supply Co., LLC v. United States*, 888 F.3d 1222, 1228 (Fed. Cir. 2018) (quoting *Bestfoods v. United States*, 165 F.3d 1371, 1373 (Fed. Cir. 1999)) (internal quotations omitted).

[21] Memorandum from Jeff Pedersen to Gary Taverman, *Scope Clarification: Antidumping and Countervailing Duty Investigations of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China*, Dep't Commerce Case Nos. A-570-979 & C-570-980 (March 19, 2012) ("AD/CVD Scope Clarification Memo") at 9. *See also* Issues and Decision Mem. for the Final Determination in the AD Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from China–9 (Oct. 9, 2012), available at http://ia.ita.doc.gov/frn/summary/prc/2012–25580–1.pdf

origin of the cell, as it is an assembly process that only strings cells together, adding a protective covering and aluminum base." Dept. of Commerce, Scope Inquiry: Solar Cells and Products, A-570-979, C-970-80, A-583-853 at 14 (Apr. 8 2021).

- "Module/panel assembly does not change the important qualities, i.e., the physical or chemical characteristics, of the solar cell itself. . . . [M]odule assembly [involves] stringing together 60 or 72 solar cells, laminating them, and fitting them in a glass-covered aluminum frame. These processes do not change the basic nature of a solar cell. Moreover, the function of a solar cell is not changed when assembled into modules/panels; the cell still functions to convert sunlight into electricity. The ITC also noted that 'the physical characteristics and functions of cells and solar modules essentially are the same. The purpose of both solar cells and solar modules/panels is to convert sunlight into electricity. Thus, neither the physical qualities nor the function of solar cells are changed when they are assembled into modules/panels." Dept. of Commerce, AD/CVD Scope Clarification Memo at 6-7.

- "Solar cells and solar modules/panels are within the same class of merchandise. Further, module assembly does not substantially alter the essential nature of solar cells nor does it constitute significant processing such that it changes the country-of-origin of the cell, as it is an assembly process that only strings cells together, adding a protective covering and an aluminum base." *Id.* at 8.

This clear legal framework established the expectation of the business community for over the last decade, with millions of dollars invested in solar deployment in the U.S. with the cell origin guiding decisions on these determinations.

b. Customs and Border Protection

CBP has consistently applied a traditional substantial transformation analysis for purposes of determining the country of origin of a product. *See Belcrest Linens v. United States*, 6 C.I.T. 204, 573 F. Supp. 1149 (1983), aff'd, 741 F.2d 1370-71 (Fed. Cir. 1984) (substantial transformation occurs when there has been a change in name, character or use). In the context of CBP's substantial transformation test, the Court of International Trade has applied the "essence test" to determine whether the identity of an article is changed through assembly or processing. *Uniroyal, Inc. v. United States*, 3 CIT 220, 225, 542 F. Supp. 1026, 1030 (1982), aff'd 702 F.2d 1022 (Fed. Cir. 1983) (holding that imported shoe uppers added to an outer sole in the United States were the "very essence of the finished shoe" and thus were not substantially transformed into a product of the United States); *Nat'l Juice Prods. Ass'n v. United States*, 10 CIT 48, 61, 628 F. Supp. 978, 991 (1986) (holding that imported orange juice concentrate 'imparts the essential character' to the completed orange juice and thus was not substantially transformed into a product of the United States).

A substantial transformation will not result from a minor manufacturing or combining process that leaves the identity of the article intact. *Compare United States v. Gibson-Thomsen Co.*, 27 C.C.P.A. 267 (1940) *and National Hand Tool Corp. v. United States*, 989 F.2d 1201 (Fed. Cir. 1992) *with* 49 CFR 661.3 (stating that a manufacturing process is more than "mere assembly of the elements or materials").

CBP determinations consistently recognize that solar cells impart the essential character of the solar panels – and that module assembly does not constitute a substantial transformation:

- In a case involving Qcells, CBP determined that the origin of solar panels manufactured in Korea and Poland from: solar cells produced in Malaysia or Korea; glass, frames, junction box, cable, connector, and back sheets from third countries; EVA from Korea or Japan; and interconnect ribbons – was to be determined by the origin of the cells. CBP stated that the most important aspect of the case was the fact that the solar cells were produced in Malaysia or Korea and not in the countries where the solar panels were assembled. CBP found that assembling solar cells into finished products did not result "in a product with a new name, character, and use" and did not constitute a substantial transformation. CBP further stated that solar cells impart the essential character of the solar panels. Accordingly, where Malaysian solar cells were used, the country of origin was Malaysia, and where Korean solar cells were used, the country of origin was Korea. CBP HQ ruling H261693 (Sept. 16, 2015).

- In a recent case, CBP found that partially processed cells from Taiwan shipped to India for finishing (by adding gridlines and circuitry) and assembly into panels did not result in a substantial transformation of the cells. Following the precedent that solar module assembly does not constitute a substantial transformation, CBP determined that the resulting panel was of Taiwanese origin. CBP HQ Ruling H301813 (May 24, 2019). Notably, CBP recalled its established practice:

  > "Furthermore, in line with our decisions in HQ H095409, HQ H261693, and HQ H298653, solar cells impart the essential character of the solar panels and assembling solar cells into finished solar panels does not result in a product with a new name, character, and use. Accordingly, as the solar cells are not substantially transformed in India, the solar cells remain the products of Taiwan, and therefore, the solar panels at issue are also the products of Taiwan."

- CBP also has found that turning bare glass tubes into functional solar panels in the United States constituted making a product with a new name, character, and use such that a substantial transformation had occurred. Key to CBP's finding that a substantial transformation had taken place was the complex manufacturing

> process of the solar cells themselves. This process—which involved depositing thin films of chemicals on the inside of glass tubes—took five of the six and a half days it took to manufacture the finished solar panels. CBP HQ Ruling H095409 (September 29, 2010).

Recommendation

We urge Treasury to be consistent with other U.S. law on which the industry has come to rely and acknowledge that manufacturing of modules does not result in substantial transformation or a new product for purposes of 49 CFR 661. For all of the foregoing reasons, we recommend Treasury and the IRS issue guidance to confirm that all manufacturing processes of solar modules *and their constituent solar cells* must occur in the United States for the solar modules to be considered "produced in the United States." Solar modules do not constitute a "new product" for purposes of 49 CFR 661 because there is no functional difference between solar cells and solar modules, and because manufacturing solar modules from solar cells does not involve a substantial transformation. Thus, all manufacturing processes of the solar cells *and* solar module must take place in the United States to be deemed to be "produced in the United States."

III. PROVIDE GUIDANCE THAT U.S. POLYSILICON, WAFERS, AND BACKSHEET WILL BE TAKEN INTO ACCOUNT FOR PURPOSES OF MEETING THE ADJUSTED PERCENTAGE REQUIREMENT FOR DOMESTIC MANUFACTURED PRODUCTS

[IRS Notice 2022-51, Section 3.03(2)(d): Does the adjusted percentage threshold rule that applies to manufactured products need further clarification? If so, what should be clarified?]

[IRS Notice 2022-51, Section 3.03(2)(e): Does the treatment of subcomponents with regard to manufactured products need further clarification? If so, what should be clarified?]

The IRA states (emphasis added):

> For purposes of clause (i), the manufactured products which are components of a qualified facility upon completion of construction shall be deemed to have been produced in the United States if not less than the adjusted percentage (as determined under subparagraph (C)) of the total costs of all such manufactured products of such facility are attributable to manufactured products *(including components)* which are mined, produced, or manufactured in the United States.

In the context of a solar facility, the term "(including components)" refers to wafers, polysilicon, and polymeric backsheets. As a general rule of statutory construction, the same word used in a statute generally is presumed to have a consistent meaning. *Ratzlaf v. United States*, 510 U.S. 135, 143 (1994) ("A term appearing in several places in a statutory text is generally read the

same way each time it appears."). However, context and statutory purpose can override the presumption. *Atlantic Cleaners & Dyers, Inc. v. United States*, 286 U.S. 427, 433 (1933) (general presumption of consistent meaning "readily yields when there is such variation in the connection in which the words are used as reasonably to warrant the conclusion that they were employed in different parts of the act with different intent.").

The term "component" is used in clause (i) and clause (iii) of the domestic content provision to refer to different parts of a solar facility. In clause (i), the term "component" is used as synonym of "manufactured product": "any steel, iron, or *manufactured product which is a component* of such facility . . ." section 45(b)(9)(B)(i). In clause (iii), the term "component" refers to constituents of manufactured products (*i.e.*, subcomponents of the qualified facility). The context of placing "including components" in parenthesis immediately after the term "manufactured products" suggests the term components refers to something in addition to manufactured products – namely, the constituents of manufactured products. That this must be so can be seen by comparing the phrase both without the parenthetical "attributable to manufactured products" and with it: "attributable to manufactured products *(including components)*".

The exact meaning of the word components in the phrase "(including components)" is not explicit in the domestic content provision of the IRA. For solar facilities, however, another provision of the IRA provides meaning. Under section 45X, the term "solar energy component" is defined to include all of the critical inputs for a solar energy facility throughout the supply chain, including: solar modules, photovoltaic cells, photovoltaic wafers, solar grade polysilicon, and polymeric backsheet. Section 45X(c)(3).

Given the statutory text and context, it is apparent that wafers, polysilicon, and backsheets "mined, produced, or manufactured in the United States" are to be taken into account when determining whether domestic manufactured products meet or surpass the adjusted percentage requirement.[22] The exact effect is left to the discretion of Treasury and the IRS – but it would seem that when a solar module has been made with U.S.-made wafers, polysilicon, and/or backsheet, some additional amount should be applied to the cost of a U.S. module for purposes of calculating whether the adjusted percentage requirement has been met. Such an approach is needed to implement the statute, which refers not only to the cost of domestic manufactured products, but also to the cost of components. For example, adding an amount equal to the acquisition cost of U.S. wafers, polysilicon, and backsheets to the costs of a U.S. module when calculating whether the adjusted percentage has been met would be consistent with the structure and text of IRA and would further incentivize the domestic solar manufacturing industry – and thereby further promote the Congressional policy objectives of the IRA to re-shore the solar supply chain.

[22] The fact that polysilicon is mined and not manufactured may help explain the use in clause (iii) of the phrase "*mined*, produced, or manufactured in the United States" instead of the phrase "produced in the United States" that appears in clause (i).

Recommendation

We urge Treasury and the IRS to provide guidance that the use of U.S.-made wafers, polysilicon, and backsheets will be taken into account, by, for example, adding an additional amount equal to the acquisition cost of U.S. wafers, polysilicon, and backsheets to the cost of U.S. solar modules when calculating whether the adjusted percentage has been met.

IV. CONCLUSION

The IRA "represents the most significant legislation to invest in clean energy and address climate change in our nation's history."[23] Consistent with the Congressional goal to strengthen the U.S. domestic solar energy supply chain, which will create thousands of high quality manufacturing jobs, bolster energy independence, supply chain and national security, and promote crucial climate objectives, we urge Treasury and the IRS to give robust effect to the domestic content bonus credit – and to use the credit to incentivize investments in the domestic supply chain well beyond module assembly. We would like to help advance the dialogue and we are available to provide further information if you have any questions regarding the foregoing recommendations. If you have any questions, please contact me at andy.munro@qcells.com.

Respectfully Yours,

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Hanwha Q CELLS USA Inc.

[23] U.S. Department of the Treasury, "Briefing on the Inflation Reduction Act Climate and Clean Energy Tax Incentive Implementation Process" (October 6, 2022).